

# Video Encoding Best Practices

## SAFARI Montage Creation Station® and Managed Home Access

### Introduction

This document provides recommended settings and instructions to prepare user-created video for use with SAFARI Montage Creation Station® for playback locally (in-school) or from home via Managed Home Access (MHA). Recommendations are provided for the following media formats:

- QuickTime® Media (.mov)
- Windows Media® (.wmv)
- H.264 (also known as MPEG-4 / AVC or MPEG-4 Part 10)

**Note:** The H.264 format is required to support playback via SAFARI Montage Managed Home Access.

The video format you choose will depend entirely on your specific needs and local environment; however, note that video encoded as QuickTime video is playable within both the Mac OS® X and Windows platforms, while Windows Media is only playable within Windows platforms.

**Note:** The QuickTime Player is required to playback QuickTime media on Windows platforms.

### Encoding Software

In order to prepare user-created video for use within SAFARI Montage, an encoding software package is required. While many products are available, two of the most common, entry-level media encoders will be referred to in this guide.

- **Apple® QuickTime Pro** – available for a nominal fee by visiting <http://www.apple.com/quicktime/pro>
- **Microsoft® Windows Media Encoder** – available for free by visiting <http://www.microsoft.com/windows/windowsmedia/forpros/encoder/default.aspx>

Additional encoding products you may wish to consider are discussed briefly under the Alternative Tools section of this document.

### SAFARI Montage Creation Station® Encoding Guidelines

To achieve a level of quality and performance similar to that seen in SAFARI Montage videos, the following settings are recommended for Windows Media and QuickTime content intended for local (in-school) playback:

| Video Profile:     |                    | Quicktime            | Windows Media        | H.264                |
|--------------------|--------------------|----------------------|----------------------|----------------------|
|                    | Resolution (size)  | 320 X 240            | 320 X 240            | 320 X 240            |
|                    | Bit Rate           | 672 kbits/sec (kbps) | 500 kbits/sec (kbps) | 300 kbits/sec (kbps) |
|                    | Frame Rate         | 29.97 fps            | 29.97 fps            | 24 fps               |
| Audio Profile:     |                    |                      |                      |                      |
|                    | Data Rate          | 128 kbps             | 96 kbps              | 32 kbps              |
|                    | Channels           | Stereo               | Stereo               | Mono                 |
|                    | Output Sample rate | 44 kHz               | 44 kHz               | 32 kHz               |
| Avg.Net Data Rate: |                    | 800 kbps             | 605 kbps             | 332 kbps             |

**Note:** These settings vary from the standards used for SAFARI Montage packaged content but provide an acceptable baseline for user-created content intended for local (in-school) and home personal playback. Additional settings are briefly discussed in the Additional Considerations section.

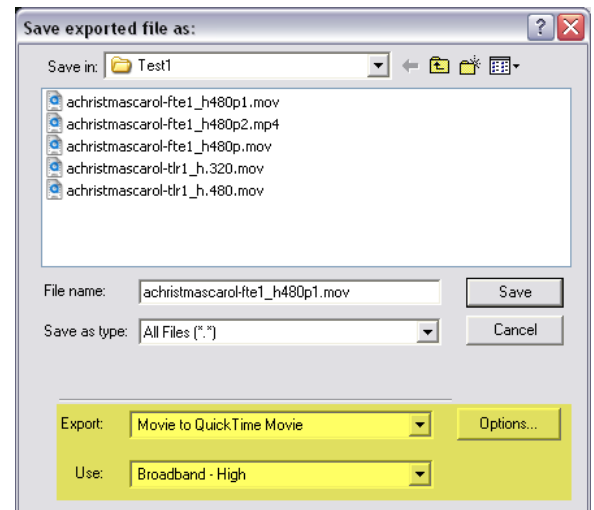
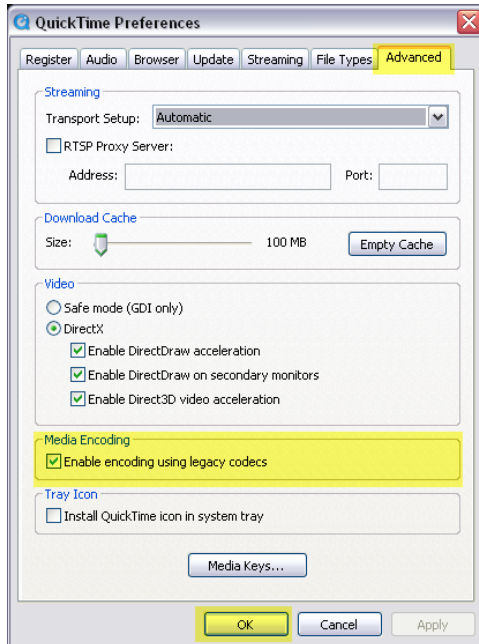
## QuickTime Pro - QuickTime Media

QuickTime Pro is an extension of the Apple QuickTime Player that allows a user to encode media to the Apple QuickTime format. Using the step-by-step instructions below will encode media for use with SAFARI Montage for in-school playback.

**Notes:** QuickTime player must be installed before QuickTime Pro can be used.

QuickTime and its actions may be slightly different across Mac OS X and Windows platforms.

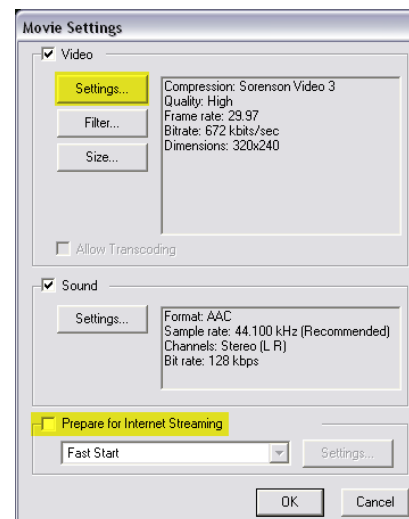
1. Launch QuickTime Player.
2. Click **Edit**, select **Preferences** and select **QuickTime Preferences**.
3. Click the **Advanced** tab, verify **Enable encoding using legacy codecs** checkbox is checked and click **OK**.
6. Choose a location and filename for your video.
7. Select **QuickTime Movie** from the Export drop-down box.
8. Select **Broadband - High** from the Use drop-down box.
9. Click **Options**.

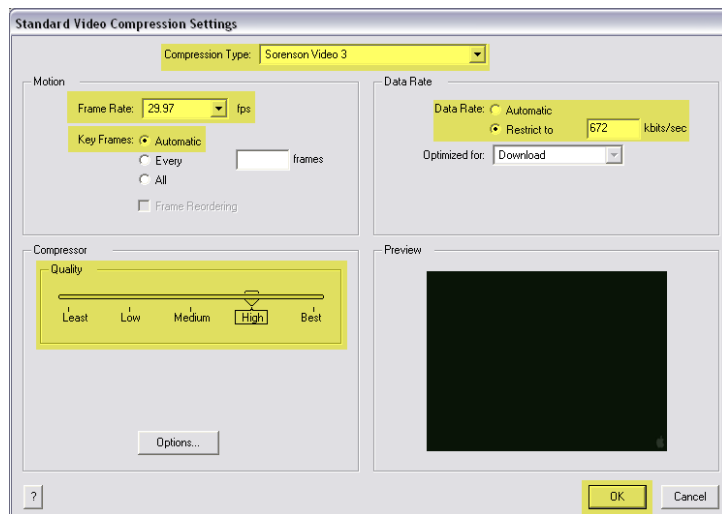


4. Click **File**, select **Open File** and choose the video file you wish to encode.
5. Click **File** and select **Export**.



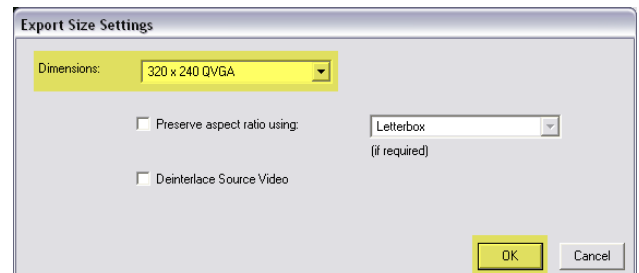
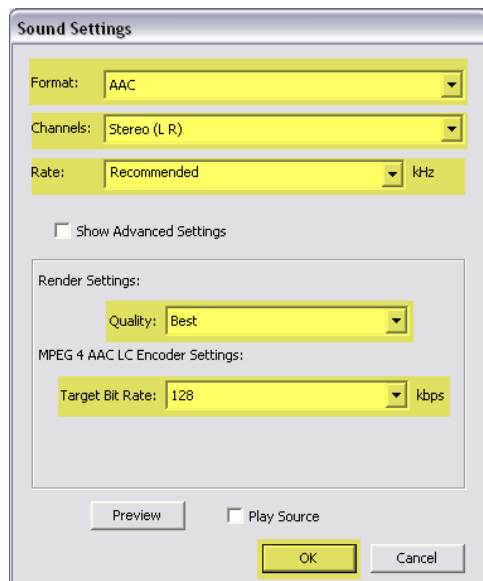
10. Uncheck **Prepare for Internet Streaming** checkbox and click **Settings** under Video and configure using the settings on the following page.





|                            |                       |
|----------------------------|-----------------------|
| <b>Compression Type:</b>   | Sorenson Video 3      |
| <b>Frame rate:</b>         | 29.97 fps             |
| <b>Key Frame:</b>          | Automatic             |
| <b>Data Rate:</b>          | Restricted : 672 kbps |
| <b>Compressor Quality:</b> | High                  |

11. Click **OK** to return to the *Movie Settings* window.
12. Click **Size** under Video, select Dimensions: **320 x 240 QVGA** and click **OK** to return to the *Movie Settings* window.
13. Click **Settings** under Audio and configure using the following settings:



|  |                            |
|--|----------------------------|
| <b>Format:</b>                         | AAC                        |
| <b>Channels:</b>                       | Stereo (L,R)               |
| <b>Rate:</b>                           | Recommended                |
| <b>Render Settings:</b>                | Quality : Best             |
| <b>MPEG 4 AAC LC Encoder Settings:</b> | Target Bit Rate : 128 kbps |

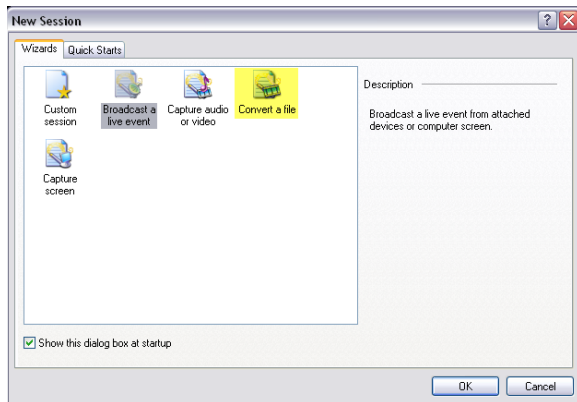
14. Click **OK** to return to the *Movie Settings* window.
15. Click **OK** to return to the *Save exported file as:* window.
16. Click **Save** to encode the video using these settings.

**Note:** Quicktime Player does not allow the user to save these settings as a profile. The user will have to complete these steps each time a video is encoded for use with SAFARI Montage.

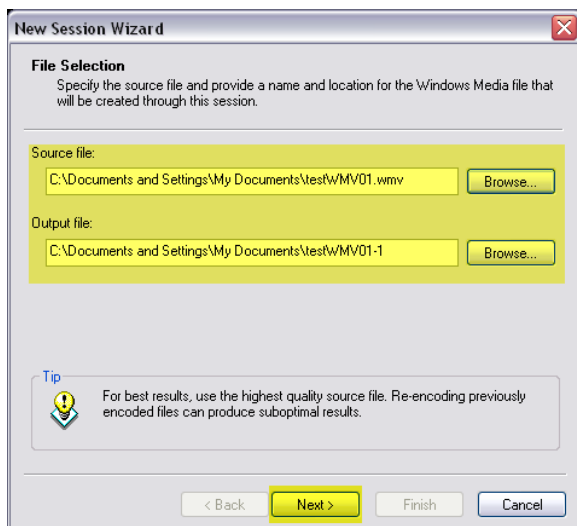
## Windows Media Encoder - Windows Media

Windows Media Encoder is a Windows-based application for encoding video to the Windows Media format. Using the steps below will guide you through encoding your first video as well as saving a Windows Media encoding **profile**, which may be reused for encoding additional videos.

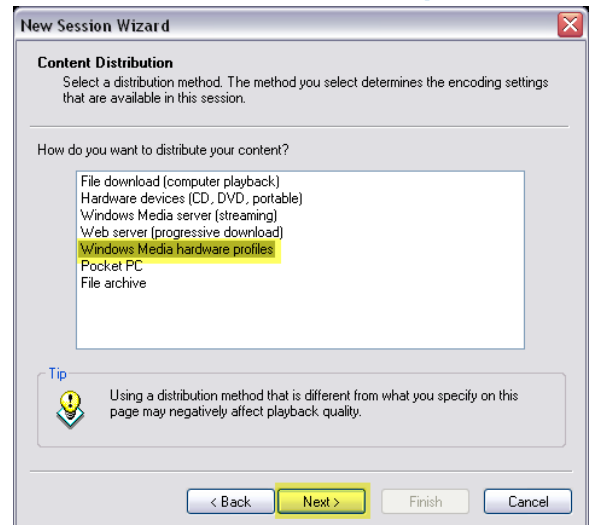
1. Launch Windows Media Encoder.
  2. Select **Convert a file** and click **OK** from the New Session window.
- Note:** If the New Session window does not appear, click **New Session** from the toolbar.



3. Click **Browse** to select the source video file to be converted.
4. Click **Browse** to select a location and name for the output video file.



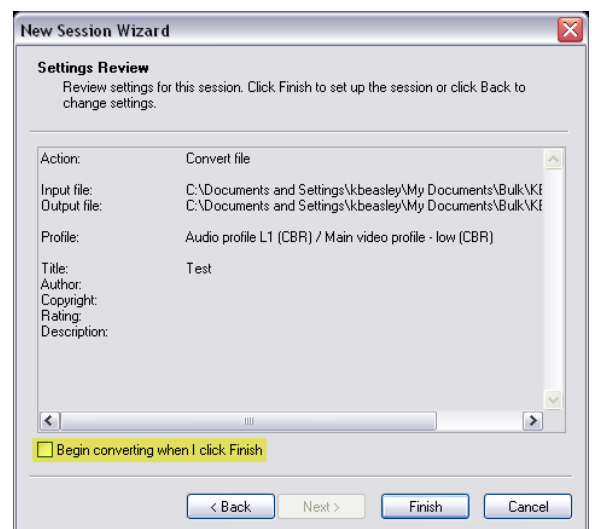
5. Click **Next** to continue.
6. Select **Windows Media hardware profiles** from the



provided list and click **Next**.

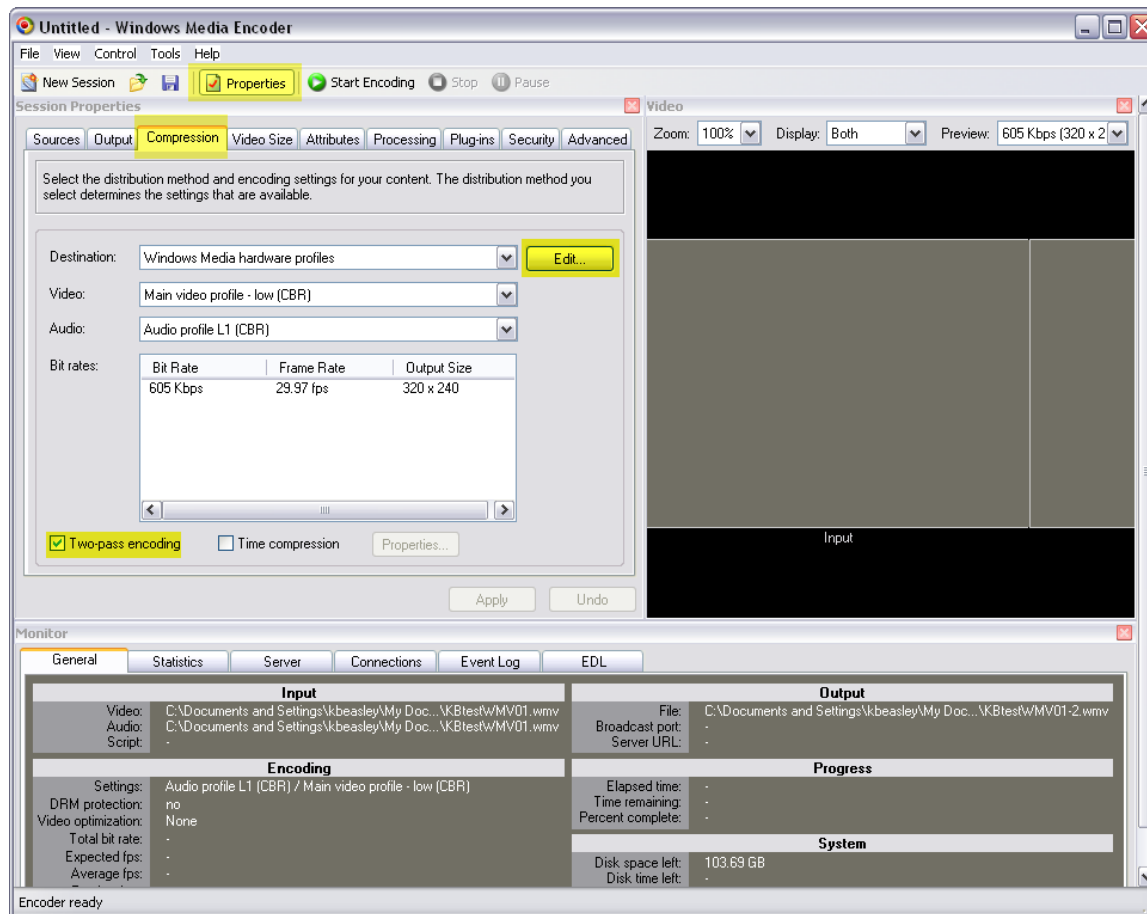
|                   |                                |
|-------------------|--------------------------------|
| <b>Video:</b>     | Main Video Profile - low (CBR) |
| <b>Audio:</b>     | Audio Profile L1 (CBR)         |
| <b>Bite rate:</b> | 605 kbps, 29.97 fps, 320 x240  |

7. Configure Encoding Options as follows:
8. Click **Next** to continue.
9. Optionally, enter additional information pertaining to the Windows Media being created and click **Next**.
10. Review the settings and uncheck **Begin converting when I click Finish**. **Note:** Additional setting must be applied prior to encoding.

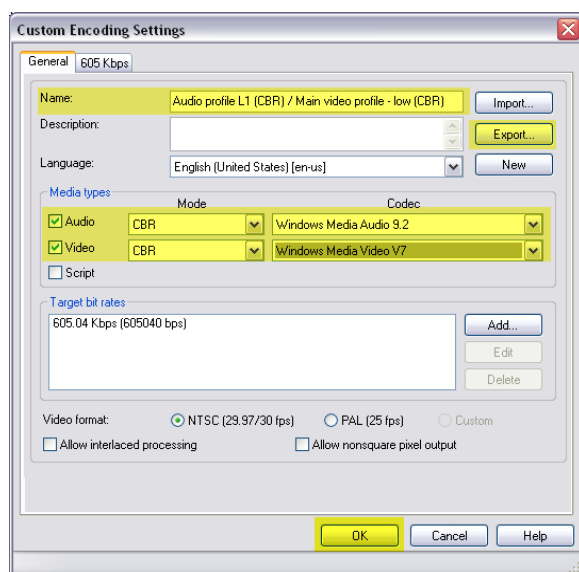


11. Click **Finish**.

12. Click **Properties** from the toolbar.
13. Click the **Compression** tab and verify the settings made earlier.
14. Check **Two-pass encoding** and click **Edit**.



15. Verify the following custom encoding settings:



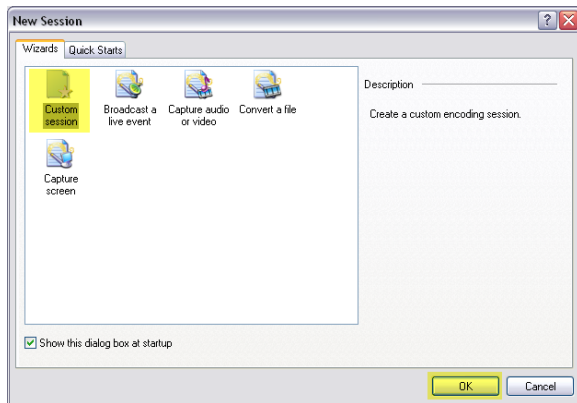
|                     |   |                         |
|---------------------|---|-------------------------|
| <b>Name:</b>        | Audio profile L1 (CBR) / Main video profile - low (CBR) |                         |
| <b>Description:</b> | Description provided by creator                         |                         |
| <b>Media Types</b>  | <b>Mode</b>   | <b>Codec</b>            |
| <b>Audio:</b>       | CBR   | Windows Media Audio 9.2 |
| <b>Video:</b>       | CBR   | Windows Media V7        |

16. Click **Export** to save the encoding profile.
- Note:** This profile will be used each time you want to encode Windows Media video for use with SAFARI Montage.
17. Click **OK** to exit Custom Encoding Settings.
18. Click **Apply** to use these settings
19. Click **Start Encoding** on the toolbar to begin encoding the video.

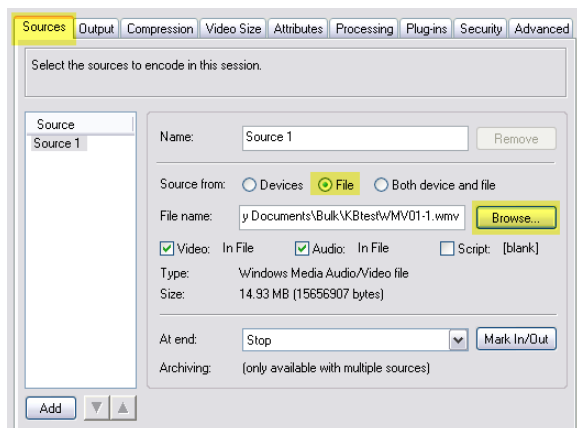
To reuse the profile created in the preceding steps, do the following:

1. Launch Windows Media Encoder.
2. Select **Custom Session** and click **OK** from the New Session window.

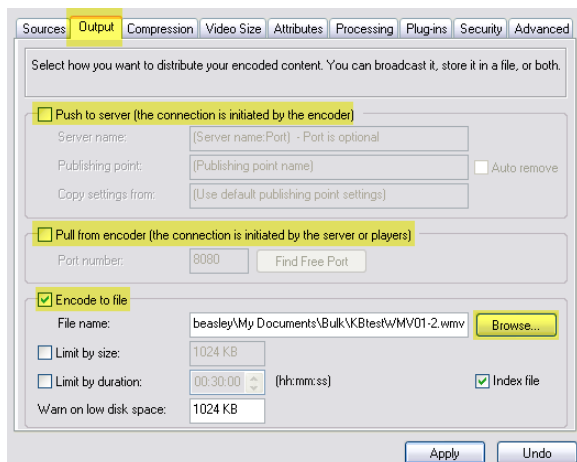
**Note:** If the New Session window does not appear, click **New Session** from the toolbar.



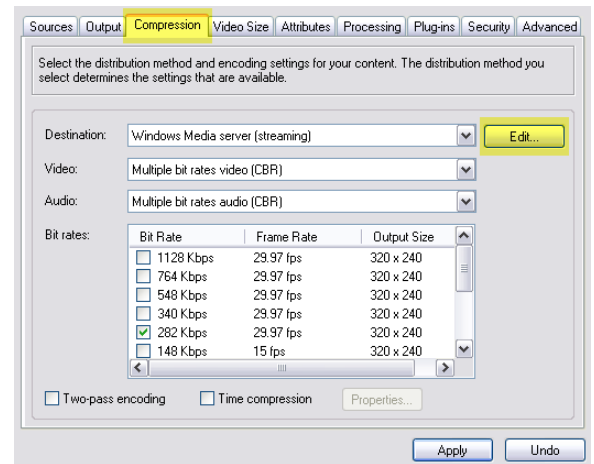
3. Click the **Sources** tab.
4. Select **File** from Source selections.
5. Click **Browse** and choose your video.



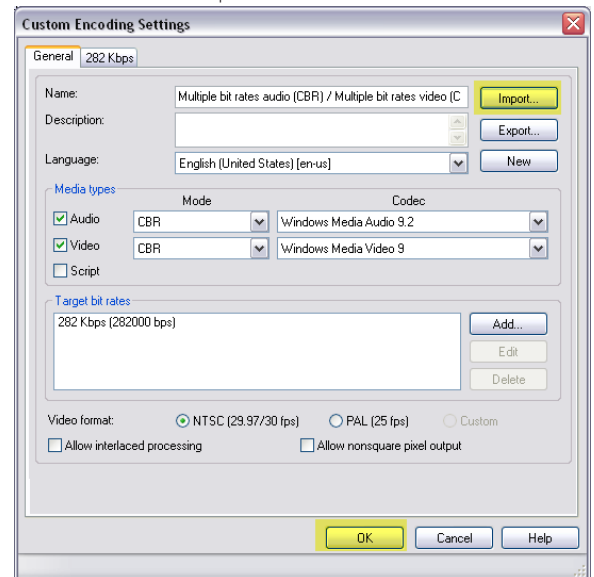
6. Click the **Output** tab.
7. Uncheck **Push to sever** and **Pull from encoder** checkboxes.
8. Check **Encode to file** checkbox.
9. Click **Browse** and select a location to save the encoded video.



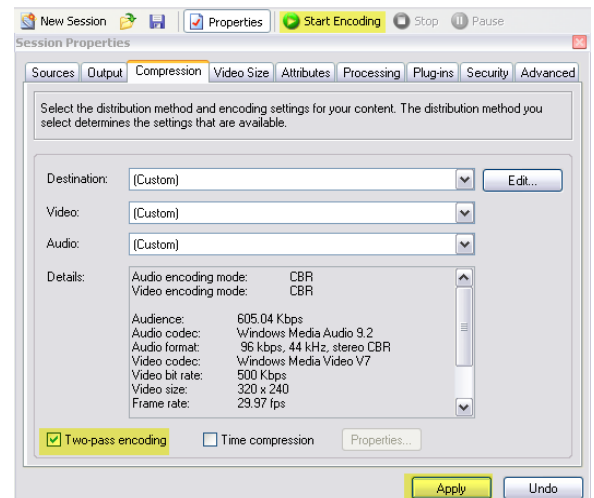
10. Click the **Compression** tab.
11. Click **Edit** next to the Destination drop-down box.



12. Click **Import** and select the saved encoding profile created earlier.
13. Click **OK** to use the profile.



14. Check **Two-pass encoding**.
15. Click **Apply** to use the custom settings.



16. Click **Start Encoding** on the toolbar to begin encoding the video.

## SAFARI Montage® Managed Home Access Encoding Guide

SAFARI Montage Managed Home Access (MHA) provides seamless home access to the same content you access in your classroom. Content is optimized for streaming over the Internet using techniques that ensure the best balance between bandwidth usage and media quality.

To extend the reach of your own original digital video files uploaded via SAFARI Montage Creation Station®, they must be prepared for streaming, which requires that:

- Videos be packaged as MPEG-4 files with a .MP4 file extension
- Videos be encoded with the H.264 Codec (also referred to as MPEG-4 Part 10)
- Videos have hint tracks

These instructions expand upon the information provided in the SAFARI Montage Creation Station® Encoding Best Practices portion of this guide and assumes that you are generally familiar with SAFARI Montage and standard use of SAFARI Montage Creation Station.

### Recommended Settings for SAFARI Montage MHA Video

For the experienced user, a summary of the recommended settings is provided below:

|                |                        |                      |
|----------------|------------------------|----------------------|
| Video Profile: |                        |                      |
|                | Format                 | H.264                |
|                | Resolution (size)      | 320 X 240            |
|                | Bit Rate               | 300 kbits/sec (kbps) |
|                | Frame Rate             | 24 fps               |
| Audio Profile: |                        |                      |
|                | Format                 | ACC-LC Music         |
|                | Data Rate              | 32 kbps              |
|                | Channels               | Mono                 |
|                | Output Sample rate     | 32 kHz               |
| Net Data Rate: | Approximately 332 kbps |                      |

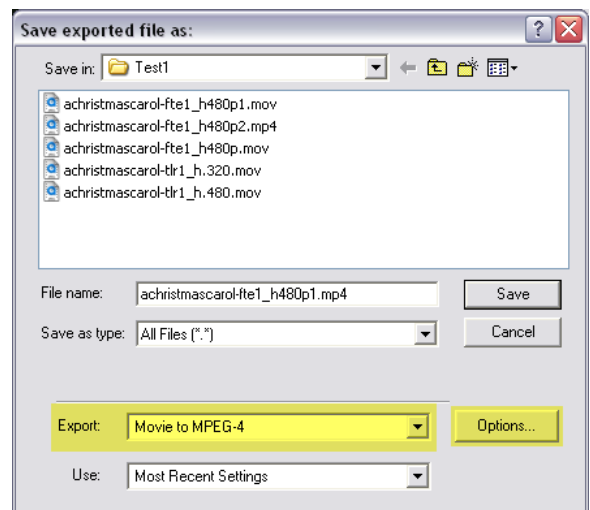
You are free to use any encoding software that supports these standards; however, it has been our experience that Apple's QuickTime Pro is an effective entry-level tool for encoding streaming videos.

### Step-by-Step Instructions to Prepare Video for SAFARI Montage MHA

For the beginner, the step-by-step instructions below prepare your video for delivery via SAFARI Montage MHA using Apple's QuickTime Pro. QuickTime Pro can be purchased by visiting Apple's web site at <http://www.apple.com/quicktime/pro/>.

You will need to start with a video file that can be played back using QuickTime. For a complete list of supported video formats, visit Apple's web site at <http://www.apple.com/quicktime/player/specs.html>.

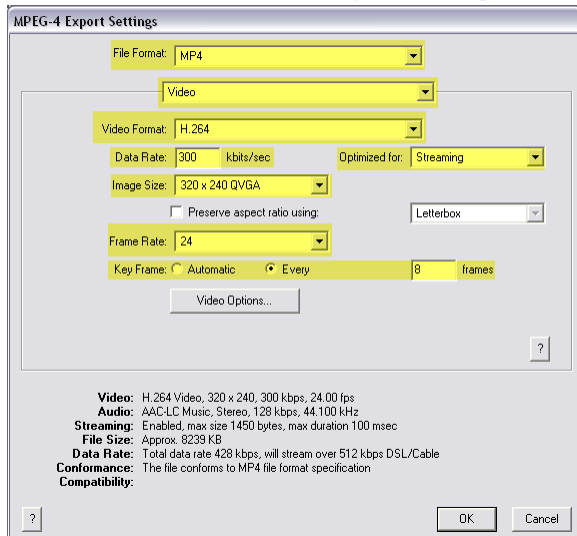
1. Launch QuickTime Player
2. Click **File**, select **Open** and choose your video file to encode.
3. Click **File** and select **Export**.
4. Choose a **Save in** location and **File name** for the file being exported.
5. Select **Movie to MPEG-4** from the **Export** drop-down.
6. Click **Options**.



- Choose **MP4** from the **File Format** drop-down of the MPEG-4 Export Settings window.
- Choose **Video** from the next drop-down. Configure the video settings as follows:

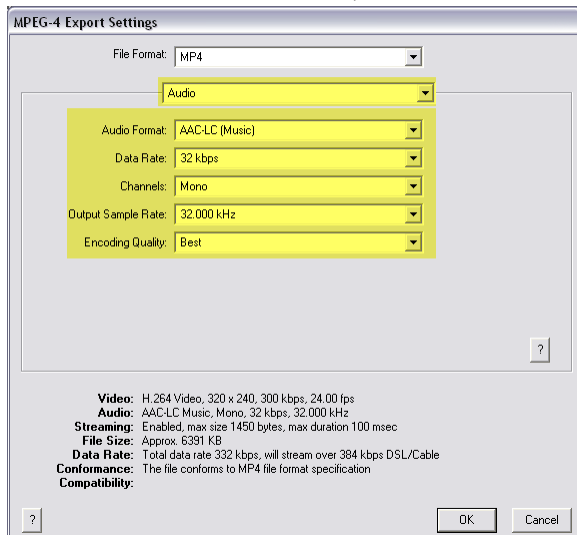
**Note:** If the **Optimized for** drop-down is disabled:

- Click **Video Options**
- Verify **Baseline** and **Best Quality (Multi-pass)** are selected.
- Click **OK**
- Choose **Streaming** from the **Optimized for** drop-down as instructed above.



|                       |                |
|-----------------------|----------------|
| <b>Video Format:</b>  | H.264          |
| <b>Data Rate:</b>     | 300 kbps       |
| <b>Optimized for:</b> | Streaming      |
| <b>Image Size:</b>    | 320 x 240 QVGA |
| <b>Frame Rate:</b>    | 24             |
| <b>Key Frame:</b>     | Every 8 frames |

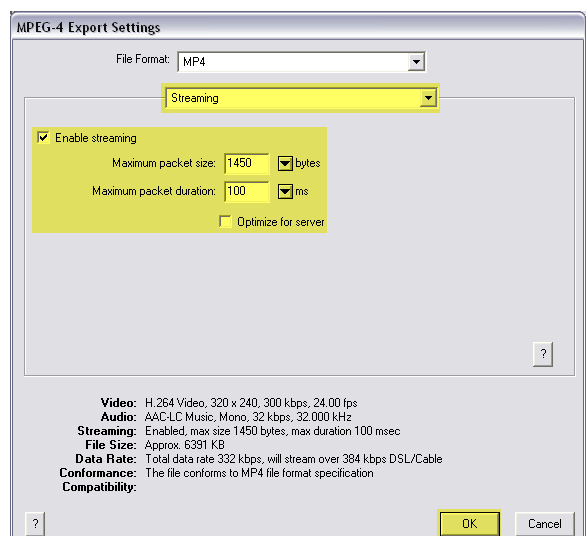
- Choose **Audio** from the same drop-down as **Video**. Configure the Audio settings as follows:



|                            |                |
|----------------------------|----------------|
| <b>Audio Format:</b>       | AAC-LC (Music) |
| <b>Data Rate:</b>          | 32 kbps        |
| <b>Channels:</b>           | Mono           |
| <b>Output Sample Rate:</b> | 32.000 kHz     |
| <b>Encoding Quality:</b>   | Best           |

- Choose **Streaming** from the same drop-down as **Video**. Configure the Streaming settings as follows:
- Click **OK** to apply these settings.

|                                 |            |
|---------------------------------|------------|
| <b>Enable streaming:</b>        | Checked    |
| <b>Maximum packet size:</b>     | 1450 bytes |
| <b>Maximum packet duration:</b> | 100 ms     |
| <b>Optimize for server:</b>     | Unchecked  |



- Click **Save** to start encoding the video.

## Managed Home Access Playback Requirements

The SAFARI Montage Media Player and QuickTime must be installed on home users' computer in order to playback streaming video through MHA.



## Additional Considerations

The settings provided are recommended to support the best performance with the widest range of input video. If you wish to experiment with these settings, you may want to consider:

- Increasing the image resolution (size) of your video to improve full-screen playback quality. We recommend that you stay between the following image resolutions:

|  |                                   |
|--|-----------------------------------|
| <b>Source Video with 4:3 Aspect Ratio</b>  | 320 x 240 and 480 x 360           |
| <b>Source Video with 16:9 Aspect Ratio</b> | 480 x 270, 640 x 360 or 720 x 405 |

- Increasing the bitrate of your video to improve full-screen playback quality and reduce pixelation (appearance of blocks during high motion scenes). For Managed Home Access video we recommend you consider home users' bandwidth and stay below 500 kbps.
- Increasing the audio bitrate and/or using Stereo instead of Mono. We recommend audio bitrates of 32 to 128 kbps.

**Note:** Each user viewing a video will use the total bitrate based on your selected settings. Example: ten users viewing a 350 kbps video stream will consume 3.5 Mbps of bandwidth.

## Uploading to SAFARI Montage via SAFARI Montage Creation Station

Once you have encoded a video, it can be uploaded to SAFARI Montage via SAFARI Montage Creation Station.

### *Multiple Videos Formats, One Title*

SAFARI Montage Creation Station supports multiple playback formats for a single video title, which allows metadata to be shared and for the video to appear as a single entry in search results. SAFARI Montage will display available video formats and determine the correct format to deliver to the user based on client platform, system settings, and whether the user is logged in from home.

Once a video is uploaded, additional playback formats may be added by accessing the Format menu while editing a SAFARI Montage Creation Station title.

For example, a single video title in SAFARI Montage may support all or any of the following playback formats:

- QuickTime (.mov)
- Windows Media Video (.wmv)
- H.264 or MPEG-4, Part 10 (.mp4)
- H.264 or MPEG-4, Part 10 - Streaming (.mp4)

Click Add Format to select a file to upload.

Add Format

Formats for 'legislators\_320\_

(Uploaded File: KBtestWMV01.wmv)

**MPEG-1** (Uploaded File: legislators\_320\_240.mpg)

### Notes:

- Video prepared for streaming may be played back locally (in school) as well as at home (via MHA).
- SAFARI Montage Creation Station will automatically recognize streaming and will make this format available through MHA.
- Although you can upload multiple **H.264 Streaming** videos at various bitrates under a single title, MHA uses the highest quality streaming video available. Remember to consider this and home users' bandwidth when preparing streaming videos.

## Alternative Tools

If you have a large number of videos to prepare, you may want to consider alternative tools with extended encoding options and batch conversion capabilities. Many of these tools also allow you convert videos from a wider variety of formats than those supported by Windows Media Encoder or QuickTime.

- Discreet® cleaner™ for PC:  
<http://usa.autodesk.com/adsk/servlet/index?id=5562182&siteID=123112>
- Discreet® cleaner™ for Mac  
<http://usa.autodesk.com/adsk/servlet/index?id=5562025&siteID=123112>
- Canopus® ProCoder®  
<http://www.canopus.com/products/ProCoderSW/index.php>

